

7 May 2021

TO: Faculty Senate

FROM: Susan Ginley, Chair, Undergraduate Curriculum Committee

RE: Interdisciplinary Neuroscience Minor

The following proposal has been approved by the Undergraduate Curriculum Committee and is recommended for approval by the Faculty Senate.

You may read the full text of the program proposal, as well as Faculty Senate Budget Committee comments, online by going to the [Online Curriculum Management System \(OCMS\) Curriculum Dashboard \(https://pdx.smartcatalogiq.com/Curriculum-Management-System/Dashboard/Curriculum-Dashboard\)](https://pdx.smartcatalogiq.com/Curriculum-Management-System/Dashboard/Curriculum-Dashboard).

**PROPOSAL SUMMARY FOR
College of Liberal Arts & Sciences
Interdisciplinary Neuroscience Minor**

Effective Term

Fall 2021

Overview of the Program

The “decade of the brain” occurring in the 1990s led to the development of brain science in a broad range of experimental and theoretical disciplines. This relatively new field includes, but is not limited to: Clinical, Mathematical, Systems, Anatomical, Developmental, Behavioral, Molecular, and Cognitive Neuroscience. The breadth of these approaches renders this field fundamentally and increasingly interdisciplinary, making a single department less relevant than cross department collaboration. Thus, undergraduate studies in Neuroscience will benefit from a cross departmental collaboration seated in Biology and Psychology, and including coursework in Computer Science, Linguistics, Philosophy, Public Health, Social Work, Speech and Hearing Sciences, and University Studies.

The coursework and program objectives will encourage students to explore the relationship between our brains and behavior. Mental health, memory, attention, perception, language, feeling, bias, creativity, and decision making in social contexts depend on nervous system structure and function. People in this field examine how the underlying biology, biochemistry and physiology of the nervous system relates to individuals’ psychological and behavioral processes.

Evidence of Need

According to the U.S. Bureau of Labor Statistics (BLS), jobs for medical scientists, including neuroscientists, are projected to grow by 13% between 2012 and 2022, which is as fast as the national average for all occupations (www.bls.gov/ooh/life-physical-and-social-science/medical-scientists.htm#tab-6). Biochemists and biophysicists (other areas in which such students could work) should experience employment growth of 19% during that same period. The BLS reports that the median annual salary for biochemists and biophysicists was \$81,480 in 2012. Medical scientists earned \$76,980.

According to a 2018 study obtained from Zion Market Research (www.zionmarketresearch.com), the global neuroscience market was valued at \$26,350 million in 2016 and is expected to reach approximately \$34,800 million by 2024. The global neuroscience market is expected to exhibit a compound annual growth rate of more than 3.5% between 2017 and 2024.

Relevant Market Report Highlights:

1. The rise in the occurrences of the neurological disorders globally has triggered the growth of the neuroscience market. There has been a rapid increase in the cases of neurological disorders such as cerebral stroke, Alzheimer's disease, epilepsy, and Parkinsonism which has increased the demand for the developments in the field of neuroscience. The demand for diagnostic procedures has increased, positively affecting market growth. Other factors that are expected to drive market growth are favorable reimbursement policies and growing government spending on the healthcare infrastructure.
2. North America held the dominant position in the global neuroscience market with more than a 38% share in 2016. Increasing R&D coupled with demand for novel and innovative technologies in brain mapping and other neurological studies is expected to propel market growth. Increased demand for neuroimaging devices in research activities is a primary trigger for the growth of the US neuroscience market. Additionally, a growing need for integrated software and diagnostic services ensure that these will be areas of continued jobs growth.
3. Hospitals dominated the end-user segment in 2016 by holding a major market share of above 35%. The increasing preference of patients towards hospitals for better diagnosis of their neurological disorders is one of the major factors driving the hospital segment. Other primary end users will include: academic Institutions, diagnostic laboratories, and research Institutes.
4. Lastly, a February 2019 year-end review by the Oregon Department of Labor Statistics (www.qualityinfo.org/-/2018-in-review-another-year-of-job-growth-and-record-low-unemployment) showed that health care and social assistance is a perennial driver of job growth in our state. This category added 5,300 jobs during 2018 for a growth rate of 2.1 percent. Ambulatory health care services, which include a range of outpatient services from physician offices to medical laboratories, added the most jobs within this sector. Hospitals, and nursing and residential care facilities followed.

Course of Study

This is one 28-credit minor that will be administered via three tracks:

- Track 1: Neuroscience Minor for Biology Majors
- Track 2: Neuroscience Minor for Psychology Majors
- Track 3: Neuroscience Minor for All Other Majors

Each track must complete the following Core Requirements (12 credits):

Area A: Neurophysiology (4 credits)

- Bi 462 Neuroscience I: Physiology of synapses and circuits, 4 credits

or

- Psy 200 Psychology as a Natural Science, 4 credits

or

- Psy 451 Introduction to Neurophysiological Psychology, 4 credits

Area B: Sensory/Motor Systems (4 credits)

- Bi 463 Neuroscience II: Sensory and Motor Systems, 4 credits

or

- Psy 347 Perception, 4 credits

or

- SpHr 461 Neurology of Speech and Hearing, 4 credits

Area C: Research/Outreach (4 credits)

- An approved 401 Research or 403 Thesis course, 4 credits

Electives (16 credits)

Additionally, each track must complete 16 credits of electives selected from the following list of approved courses:

Track 1: Neuroscience Minor for Biology Majors

Electives: 16 credits selected from the following list of approved courses:

- CS 441 Artificial Intelligence, 4 credits
- CS 445 Machine Learning, 4 credits
- Ling 233 Language and the Mind, 4 credits
- Ling 433 Psycholinguistics, 4 credits
- Ling 445 Linguistics and Cognitive Science, 4 credits
- PHE 466 Mind/Body Health: Disease Prevention, 4 credits
- PHE 467 Mind/Body Health: Human Potential, 4 credits
- PHE 473 Physiology of Exercise, 4 credits
- Phl 432 Philosophy of the Mind, 4 credits
- Phl 471 Topics in Philosophy of Science: Cognitive Science, 4 credits
- Phl 471 Topics in Philosophy of Science: Psychiatry, 4 credits
- Psy 346 Learning, 4 credits
- Psy 348 Cognition, 4 credits
- Psy 399 Neuroscience and Behavior, 4 credits
- Psy 410: Cognitive Neuroscience
- Psy 410: Neuroscience Outreach: The Brain in Real Life
- Psy 434 Introduction to Psychopathology, 4 credits
- Psy 450 Psychopharmacology

- Psy 452: Advanced Neurophysiological Psychology
- Psy 471 Health Psychology, 4 credits
- SpHr 471 Neurolinguistics, 4 credits
- SpHr 495 Neurogenic Communication Disorders, 4 credits

Track 2: Neuroscience Minor for Psychology Majors

Electives: 16 credits selected from the following list of approved courses

- Bi 207 Biology for Allied Health I, 4 credits or Bi 211 Principles of Biology: Molecular Cell Biology & Genetics, 4 credits and Bi 214 Principles of Biology Lab I, 1 credit
- Bi 208 Biology for Allied Health: Evolution and Diversity of Life, 4 credits or Bi 212 Principles of Biology: Development, Evolution & Ecology, 4 credits and Bi 215 Principles of Biology Lab II, 1 credit
- Bi 209 Biology for Allied Health: Anatomy and Physiology Systems, 4 credits or Bi 213 Principles of Biology: Organisms, Biodiversity & Conservation, 4 credits and Bi 216 Principles of Biology Lab III, 1 credit
- Bi 301 Human Anatomy and Physiology, 4 credits
- Bi 302 Human Anatomy and Physiology, 4 credits
- Bi 303 Human Anatomy and Physiology, 4 credits
- Bi 320 Organismal Physiology, 4 credits
- Bi 412 Animal Behavior, 4 credits
- Bi 456 Developmental Biology, 4 credits
- CS 441 Artificial Intelligence, 4 credits
- CS 445 Machine Learning, 4 credits
- Ling 233 Language and the Mind, 4 credits
- Ling 433 Psycholinguistics, 4 credits
- Ling 445 Linguistics and Cognitive Science, 4 credits
- PHE 466 Mind/Body Health: Disease Prevention, 4 credits
- PHE 467 Mind/Body Health: Human Potential, 4 credits
- PHE 473 Physiology of Exercise, 4 credits
- Phl 432 Philosophy of the Mind, 4 credits
- Phl 471 Topics in Philosophy of Science: Cognitive Science, 4 credits
- Phl 471 Topics in Philosophy of Science: Psychiatry, 4 credits
- SpHr 471 Neurolinguistics, 4 credits
- SpHr 495 Neurogenic Communication Disorders, 4 credits

Track 3: Neuroscience Minor for All Other Majors

Electives: 16 credits selected from the following list of approved courses

- Bi 207 Biology for Allied Health I, 4 credits or Bi 211 Principles of Biology: Molecular Cell Biology & Genetics, 4 credits and Bi 214 Principles of Biology Lab I, 1 credit
- Bi 208 Biology for Allied Health: Evolution and Diversity of Life, 4 credits or Bi 212 Principles of Biology: Development, Evolution & Ecology, 4 credits and Bi 215 Principles of Biology Lab II, 1 credit
- Bi 209 Biology for Allied Health: Anatomy and Physiology Systems, 4 credits or Bi 213 Principles of Biology: Organisms, Biodiversity & Conservation, 4 credits and Bi 216 Principles of Biology Lab III, 1 credit

- Bi 301 Human Anatomy and Physiology, 4 credits
- Bi 302 Human Anatomy and Physiology, 4 credits
- Bi 303 Human Anatomy and Physiology, 4 credits
- Bi 320 Organismal Physiology, 4 credits
- Bi 412 Animal Behavior, 4 credits
- Bi 456 Developmental Biology, 4 credits
- CS 441 Artificial Intelligence, 4 credits
- CS 445 Machine Learning, 4 credits
- Ling 233 Language and the Mind, 4 credits
- Ling 433 Psycholinguistics, 4 credits
- Ling 445 Linguistics and Cognitive Science, 4 credits
- PHE 466 Mind/Body Health: Disease Prevention, 4 credits
- PHE 467 Mind/Body Health: Human Potential, 4 credits
- PHE 473 Physiology of Exercise, 4 credits
- Phl 432 Philosophy of the Mind, 4 credits
- Phl 471 Topics in Philosophy of Science, 4 credits
- Psy 346 Learning, 4 credits
- Psy 348 Cognition, 4 credits
- Psy 399 Neuroscience and Behavior, 4 credits
- Psy 410: Cognitive Neuroscience
- Psy 410: Neuroscience Outreach: The Brain in Real Life
- Psy 434 Introduction to Psychopathology, 4 credits
- Psy 450 Psychopharmacology, 4 credits
- Psy 452: Advanced Neurophysiological Psychology, 4 credits
- Phl 471 Topics in Philosophy of Science: Cognitive Science, 4 credits
- Phl 471 Topics in Philosophy of Science: Psychiatry, 4 credits
- SpHr 471 Neurolinguistics, 4 credits
- SpHr 495 Neurogenic Communication Disorders, 4 credits
- SW 441 Psychobiology for Social Workers, 4 credits